Tagging of Herring in British Columbia during the 1983-84 Herring Season

C. W. Haegele

Department of Fisheries and Oceans
Fisheries Research Branch
Pacific Biological Station
Nanaimo, British Columbia V9R 5K6

December 1984

Canadian Industry Report of Fisheries and Aquatic Sciences No. 154

85-2392/

Canadian Industry Report of Fisheries and Aquatic Sciences

These reports contain the results of research and development that are useful to industry for either immediate or future application. Industry Reports are directed primarily towards individuals in the primary and secondary sectors of the fishing and marine industries. No restriction is placed on subject matter and the series reflects the board interests and policies of the Department of Fisheries and Oceans, namely, fisheries management, technology and development, ocean sciences, and aquatic environments relevent to Canada.

Industry Reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report will be abstracted in *Aquatic Sciences and Fisheries Abstracts* and will be indexed annually in the Department's index to scientific and technical publications.

Numbers 1-91 in this series were issued as Project Reports of the Industrial Development Branch, Technical Reports of the Industrial Development Branch, and Technical Reports of the Fisherman's Service Branch. Numbers 92-110 were issued as Department of Fisheries and the Environment, Fisheries and Marine Service Industry Reports. The current series name was changed with report number 111.

Details on the availability of Industry Reports in hard copy may be obtained from the issuing establishment on the front cover.

Rapport canadien à l'industrie sur les sciences halieutiques et aquatiques

Ces rapports contiennent les résultats des recherches et des progrès qui peuvent être utiles à l'industrie pour des applications soit immédiates, soit futures. Ils sont préparés à l'intention principalement des membres des secteurs primaire et secondaire de l'industrie des pêches et de la mer. Il n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques du Ministère des Pêches et des Océans, notamment gestion des pêches, techniques et développement, sciences océaniques et environnements aquatiques, au Canada.

Les Rapports destinés à l'industrie peuvent être considérés comme des publications complètes. Le titre exact paraît au haut du résumé de chaque rapport, qui sera publié dans la revue *Aquatic Sciences and Fisheries Abstracts* et qui figurera dans l'index annuel des publications scientifiques et techniques du Ministère.

Les numéros de 1 à 91 de cette série ont été publiés à titre de rapports sur les travaux de la Direction du développement industriel, de rapports techniques de la Direction du développement industriel, et de rapports techniques de la Direction des services aux pêcheurs. Les numéros 92 à 110 ont été publiés à titre de Rapports à l'industrie du Service des pêches et de la mer, Ministère des Pêches et de l'Environnement. Le nom de la série a été changé à partir du rapport numéro 111.

La page couverture porte le nom de l'établissement auteur où l'on peut se procurer les rapports sous couverture cartonnée.

Canadian Industry Report of

Fisheries and Aquatic Sciences No. 154

December 1984

TAGGING OF HERRING IN BRITISH COLUMBIA DURING THE 1983-84 HERRING SEASON

by

C. W. Haegele

Department of Fisheries and Oceans

Fisheries Research Branch

Pacific Biological Station

Nanaimo, British Columbia V9R 5K6

(c) Minister of Supply and Services Canada 1984

Cat. No. Fs 97-14/154E ISSN 0704-3694

Correct citation for this publication:

Haegele, C. W. 1984. Tagging of herring in British Columbia during the 1983-84 herring season. Can. Ind. Rep. Fish. Aquat. Sci. 154: 26 p.

ABSTRACT

Haegele, C. W. 1984. Tagging of herring in British Columbia during the 1983-84 herring season. Can. Ind. Rep. Fish. Aquat. Sci. 154: 26 p.

Herring were tagged with external anchor tags in southern British Columbia as follows: 17,619 released in Johnstone Strait in November and 19,665 released in the lower Strait of Georgia in November and December. There were 184 tags recovered, 76% of which were from the above taggings. Fish from Deepwater Bay migrated mostly to Area 15 to spawn and fish from Okisollo Channel did not migrate out of Johnstone Strait to spawn. Fish that resided in the lower Strait of Georgia in late November and December were mostly Area 17 spawners, the Area 14 spawners having left this area by late November. Results of experiments with coded wire tagging equipment are presented.

Key words: Pacific herring, stock identification, tagging, migration

RÉSUMÉ

Haegele, C. W. 1984. Tagging of herring in British Columbia during the 1983-84 herring season. Can. Ind. Rep. Fish. Aquat. Sci. 154: 26 p.

Dans le sud de la Colombie-Britannique, des étiquettes externes à ancrage ont été fixées à des harengs qui ont été relâchés selon le schème suivant: 17,619 dans le détroit Johnstone, en novembre, et 19,665 dans la partie inférieure du détroit de Géorgie, en novembre et décembre. Des 184 étiquettes récupérées, 76% provenaient de ces étiquetages. Les poissons de la baie Deepwater ont surtout migré vers la zone 15 pour frayer et ceux du chenal Okisollo n'ont pas quitté le détroit Johnstone pour la fraie. Les harengs présents dans la partie inférieure du détroit de Géorgie à la fin de novembre et en décembre étaient surtout des reproducteurs de la zone 17, car ceux de la zone 14 avaient déjà quitté les lieux à la fin de novembre. Les résultats d'expériences menées à l'aide de fils métalliques codés sont aussi présentés.

Mots-clés: hareng du Pacifique, identification des stocks, étiquetage, migration

INTRODUCTION

In British Columbia herring have been tagged with external anchor tags since the fall of 1979 to determine stock distribution and migration. Initially tagging was done coastwide but since 1982 it has been confined to the south coast. During the 1983-84 herring season (July 1, 1983 to June 30, 1984) tagging with external anchor tags was limited to the fall (November and December) in Johnstone and Georgia straits. As well, experiments with coded wire tags were conducted in the spring (February) to evaluate the suitability of tagging equipment. The subject of this report is these taggings and external anchor tag returns in the 1983-84 herring season.

METHODS

ANCHOR TAGS

Herring were tagged with yellow "short" Floy anchor tags (Type FD-68BC) that had a 32 mm long plastic portion, bearing the printed legend, connected to the toggle by an 8 mm long piece of monofilament. Fish were captured by seine, dipnetted from the seine into a plastic tub partially filled with seawater, tagged and returned to the seine. The entire catch, containing both tagged and untagged fish, was released after tagging was completed. Samples of fish were obtained from most sets. These fish were frozen and later sampled for age.

Posters describing the tagging program were placed in fish processing plants and fisheries offices. Postage pre-paid tag return envelopes were made available at these locations. Returned tags were entered in prize draws. There was a draw for tags returned between July 1, 1983 and Jan. 30, 1984 in which 5 prizes totalling $450 were awarded (Appendix table 1) and a draw for tags returned between Feb. 1, 1984 and June 30, 1984 in which 16 prizes totalling $550 were awarded (Appendix table 2).

CODED WIRE TAGS

For coded wire tagging, herring were seined and dipnetted into plastic tubs as for anchor tagging. The tags were implanted in the dorsal musculature posterior to the cranium and the tagged fish returned to the seine through a magnetizing unit, which was a 12 cm I.D. pipe supplied with running seawater. The entire catch, containing both tagged and untagged fish, was released after tagging was completed. Samples of fish were obtained from all sets, frozen, and later sampled for age.

RESULTS AND DISCUSSION

ANCHOR TAGGING

Tag releases

In the 1983-84 herring season, 37,284 tagged herring were released (Table 1).

Johnstone Strait: There were 17,619 tagged herring released from 15 sets made from the CALIGUS in Johnstone Strait between Nov. 8 and 29, 1983 (Table 2; Figs. 1, 2). The fish from the 10 sets in Deepwater Bay were mostly 3-year-old (43%) and 4-year-old (26%), the fish from the single set in Kanish Bay were mostly 1-year-old (44%) and 2-year-old (31%), and the fish from the 4 sets in Chonat Bay were mostly 2-year-old (49%) and 3-year-old (33%). Peak abundance of herring in the area of tagging was on Nov. 9 (R. Armstrong, pers. comm.).

Strait of Georgia: In the lower Strait of Georgia there were 19,665 tagged herring released from 17 sets made from the CALIGUS and WALKER ROCK between Nov. 22 and Dec. 16, 1983 (Table 3). The fish from the 9 sets made in upper Stuart Channel (Fig. 3) were mostly 2-year-old (76%) and 3-year-old (22%), and the fish from 8 sets made in lower Trincomali Channel (Fig. 4) were mostly 2-year-old (41%), 3-yr-old (36%) and 4-year-old (14%). There were an estimated 4500 tonnes of herring in the area of tagging in mid-December (R. Armstrong, pers. comm.).

Tag recoveries

There were 184 tags recovered during the 1983-84 herring season and details on the date and locality of release and recapture, fishery, gear and tag type are published in a data report by Haegele (1984b). Recoveries were obtained from all tagging periods except from the first tagging in the fall of 1979 (Table 4). Approximately half the recovered tags were from the 1983 fall taggings that were recovered in the 1984 roe fishery. Recoveries by period at large were as follows:

Period at large	Number of tags
Less than 1 month	20
1 to 3 months	41
3 to 6 months	84
6 months to 1 year	10
1 to 2 years	15
Longer than 2 years	14

Queen Charlotte Islands: There have been no taggings in the Queen Charlotte Islands since the spring of 1981. There were three recoveries in the Section Cove 1984 seine roe fishery from 1981 spring taggings in nearby Swan Bay (2 tags) and Flamingo Inlet. In the Poole Inlet 1984 gillnet roe

fishery there was one return from the 1982 spring tagging in Barkley Sound. There was also a recovery in August 1983 off the north coast of the Queen Charlotte Islands of a fish tagged in the fall of 1980 in Browning Entrance. These recoveries agree with conclusions drawn from earlier returns that the fish that spawn from Cumshewa to Flamingo inlets comprise one stock, that some fish emigrate from the west coast of Vancouver Island to the Queen Charlotte Islands and that some of the fish found in Browning Entrance in the late fall migrate to the Queen Charlotte Islands to spawn (Haegele et al. 1983; Haegele 1984a).

North coast: There were only four recoveries on the north coast, all of which were made in the 1984 Kitkatla Inlet seine roe fishery (none were made in the 1984 Big Bay gillnet roe fishery). One of the recoveries had been released on the north coast in the spring of 1982, the others were from taggings made in the fall of 1983 in Johnstone Strait. It is possible that the recovery information for the Johnstone Strait tags was incorrect, however, it is also possible that fish migrate from Johnstone Strait to Kitkatla Inlet within the same season. There have been no other returns that would confirm such movement.

Central Coast: There were three returns in the 1984 Area 7 roe fisheries, two from taggings made in the spring of 1980 in the central coast and one from a tagging made in the spring of 1981 in the central coast. These returns after 3 and 4 years at large would support earlier conclusions that central coast spawners are a discrete stock (Haegele et al. 1983).

Johnstone Strait: The results from fall 1983 Johnstone Strait taggings differ from results obtained from fall 1982 taggings. The 1982 tagging produced very few returns in the 1983 roe fishery (Table 5) while the 1983 tagging produced a high tag density in the 1984 seine roe fishery near Sliammon (Table 6). The 1984 recoveries suggest that Area 15 stocks originated largely in Johnstone Strait. The lower tag density in the 1983 roe fishery can be partially attributed to the difference in the distribution of tag releases in the two years (Table 7). In 1983, 70% of the tags were released in Deepwater Bay while in 1982 only 25% of the tags were released there. The other tags were released in Kanish and Chonat bays. Apparently fish tagged in Deepwater Bay migrated mostly to Area 15 to spawn while 90% of the fish tagged in Chonat Bay did not migrate out of Johnstone Strait. About half the fish tagged in Kanish Bay migrated out of Johnstone Strait to spawn.

Strait of Georgia: There were considerably fewer tag returns from 1983 fall taggings in the Strait of Georgia in 1984 roe fisheries than from all previous fall taggings in the Strait of Georgia and subsequent roe fisheries (Table 5). It had been concluded from earlier taggings and returns that Area 14 spawners migrated from offshore banks through the lower Strait of Georgia earlier than Area 17-N and 17-S spawners and did not remain in the lower Strait of Georgia after November but were holding in areas further north (Haegele 1984a). The returns from the 1983 fall tagging in the 1984 roe fishery provided additional evidence to support this conclusion. Tag densities from 1981, 1982 and 1983 fall taggings in subsequent roe fisheries were 3 to 7 times higher in Area 17-S and Area 17-N than in Area 14 (Table 6). In the 1984 roe fishery, the density of tags from 1983 fall taggings in Area 14 was, on the average, 0.06 of tag density in previous years. In 1983 tagging was begun in late November while in previous years it

was begun in early November. Hence, in 1983, most of the Area 14 spawners appear to have already moved through the lower Strait of Georgia at the time of tagging and were residing elsewhere. As well, there were 50 tags from 1983 fall taggings recovered in the relatively small special license catches in Area 17-S and Area 18 between Dec. 16, 1983 and Feb. 10, 1984, indicating that most of the tagged fish remained in the area of tagging.

West coast Vancouver Island: On the west coast of Vancouver Island there were 15 tags returned from the Barkley Sound 1984 seine roe fishery and none from the Esperanza Inlet 1984 gillnet roe fishery. The returns were 1 tag from a fall 1981 offshore tagging, 4 tags from spring 1982 taggings in Barkley Sound, 3 tags from spring 1983 taggings in Barkley Sound, 2 tags from spring 1983 taggings in Clayoquot Sound, 1 tag from a spring 1983 tagging in Nootka Sound, 1 tag from a fall 1982 and 3 tags from fall 1983 taggings in Johnstone Strait. The returns in Barkley Sound of Johnstone Strait tags have some precedent, 2 tags from fall 1982 Johnstone Strait taggings were recovered in the 1983 Barkley Sound roe fishery. Hence, it would appear that some of the fish found in inside waters in the fall migrated to the west coast of Vancouver Island to spawn. There have also been returns in previous years of fish from fall taggings made in the lower Strait of Georgia in west coast of Vancouver Island roe fisheries (Haegele 1984a). However, these returns were so few, in comparison to returns in inside waters, that they indicated less than 5% emigration (Table 6). The return of Clayoquot Sound and Nootka Sound tags confirmed that there was some mixing of spawners of the major inlets on the west coast but fidelity of returns remained high for Barkley Sound -- it was previously estimated at 80% (Haegele 1984a).

CODED WIRE TAGGING

There were seven taggings with coded wire tags made with fish obtained from sets made by the test fishing charter vessel WESTVIEW #1 (Table 8). The age composition for these stocks was average with 43% 3-year-old, 33% 4-year-old and 21% 5-year-old and older. The tagging equipment performed satisfactorily and approximately 400 fish were tagged per hour per machine (Table 9). There appeared to be no improvement in the tagging rate with experience and it appeared that tagging rates decreased with time spent tagging. The latter can be attributed to the loss of manual dexterity from handling fish in frigid water. Fish were held in the seine for tagging for 1.17 to 3.25 hours, averaging 2.05 hours. The amount of time available for tagging depended on the behaviour and condition of the fish and this varied with weather, current, and time of day. With minor modifications to the equipment and tagging procedures, it should be possible to tag 2000 fish per set with 2 tagging machines. This is comparable to tagging rates achieved with external anchor tags.

ACKNOWLEDGEMENTS

D. Miller assisted with the tagging from the CALIGUS. R. Armstrong and D. Chalmers fished and tagged from the WALKER ROCK. B. McCarter assisted with the coded wire tagging. The skippers and crew of the CALIGUS and the WESTVIEW #1 provided valuable assistance and advice. P. Ostrander obtained tag recovery information in the processing plants.

REFERENCES

Haegele, C. W. 1984a. Tagging of herring in British Columbia during the 1982-83 herring season. Can. Ind. Rep. Fish. Aquat. Sci. 151: 54 p

1984b. Herring tag returns in British Columbia for the 1983-84 herring season. Can. Data Rep. Fish. Aquat. Sci. (In press)

Haegele, C. W., C. E. Turner, L. Hop Wo, and D. C. Miller. 1983. Tagging of herring in British Columbia during the 1981-82 herring season. Can. Ind. Rep. Fish. Aquat. Sci. 14: x + 65p.

Table 1. Herring tags inserted in British Columbia during the 1983-84 herring season - by tag number series.

Tag series	Division	Section	Location	Map Ref.	Tag Mth.	Tag Type	Fish Rel.	Date
H365000 - 365499	Johnstone Strait	Kanish Bay	Deepwater Bay	(A01)	SN	Short- Y	499	08/11/83
H365500 - 366499	Johnstone Strait	Kanish Bay	Deepwater Bay	(A02)	SN	Short- Y	997	08/11/83
H366500 - 367499	Johnstone Strait	Kanish Bay	Deepwater Bay	(A03)	SN	Short- Y	992	09/11/83
H367500 - 367999	Johnstone Strait	Kanish Bay	Kanish Bay	(A11)	SN	Short- Y	497	09/11/83
H368000 - 368999	Johnstone Strait	Kanish Bay	Deepwater Bay	(A04)	SN	Short- Y	990	16/11/83
H369000 - 369999	Johnstone Strait	Kanish Bay	Deepwater Bay	(A05)	SN	Short- Y	995	18/11/83
H370000 - 370999	Johnstone Strait	Kanish Bay	Deepwater Bay	(A06)	SN	Short- Y	1465	18/11/83
H381000 - 381499	Johnstone Strait	Kanish Bay	Deepwater Bay	(A06)	SN	Short- Y	1465	18/11/83
H381500 - 382999	Johnstone Strait	Other Area 13 Strait	Chonat Bay	(B01)	SN	Short- Y	1470	21/11/83
H383000 - 384499	Johnstone Strait	Other Area 13 Strait	Chonat Bay	(B02)	SN	Short- Y	1468	21/11/83
H384500 - 385499	Johnstone Strait	Other Area 13 Strait	Chonat Bay	(B03)	SN	Short- Y	988	22/11/83
H385500 - 386499	Johnstone Strait	Other Area 13 Strait	Chonat Bay	(B04)	SN	Short- Y	992	22/11/83
H386500 - 388499	Johnstone Strait	Kanish Bay	Deepwater Bay	(A07)	SN	Short- Y	1971	28/11/83
H388500 - 389999	Johnstone Strait	Kanish Bay	Deepwater Bay	(A08)	SN	Short- Y	1477	28/11/83
H390000 - 390999	Johnstone Strait	Kanish Bay	Deepwater Bay	(A09)	SN	Short- Y	1950	29/11/83
H397000 - 397999	Strait of Georgia	Yellow Point	Danger Reefs	(C01)	SN	Short- Y	994	22/11/83
H398000 - 398999	Strait of Georgia	Yellow Point	Boulder Point	(C02)	SN	Short- Y	991	23/11/83
H399000 - 399499	Strait of Georgia	Other Area 17	Parker Island	(D01)	SN	Short- Y	500	06/12/83
H399500 - 399999	Strait of Georgia	Other Area 17	Parker Island	(D06)	SN	Short- Y	1495	07/12/83

Table 1 (cont'd)

Tag series	Division	Section	Location	Map Ref.	Tag Mth.	Tag Type	Fish Rel.	Date
H400000 - 400999	Strait of Georgia	Other Area 17	Parker Island	(D02)	SN	Short- Y	997	06/12/83
H402000 - 402999	Strait of Georgia	Other Area 17	Parker Island	(D04)	SN	Short- Y	1000	06/12/83
H403000 - 403999	Strait of Georgia	Other Area 17	Parker Island	(D06)	SN	Short- Y	1495	07/12/83
H404000 - 405999	Strait of Georgia	Other Area 17	Montague Harbour	(D07)	SN	Short- Y	1993	15/12/83
H406000 - 406999	Strait of Georgia	Other Area 17	Montague Harbour	(D08)	SN	Short- Y	999	16/12/83
H408000 - 408999	Johnstone Strait	Kanish Bay	Deepwater Bay	(A09)	SN	Short- Y	1950	29/11/83
H409000 - 409899	Johnstone Strait	Kanish Bay	Deepwater Bay	(A10)	SN	Short- Y	868	29/11/83
H411000 - 412499	Strait of Georgia	Yellow Point	Boat Harbour	(C03)	SN	Short- Y	1440	05/12/83
H412500 - 413499	Strait of Georgia	Yellow Point	Boat Harbour	(C04)	SN	Short- Y	973	05/12/83
H413500 - 414499	Strait of Georgia	Other Area 17	Parker Island	(D03)	SN	Short- Y	955	06/12/83
H414500 - 415499	Strait of Georgia	Other Area 17	Parker Island	(D05)	SN	Short- Y	988	07/12/83
H415500 - 416499	Strait of Georgia	Yellow Point	Ruxton Pass	(C05)	SN	Short- Y	970	13/12/83
H416500 - 417499	Strait of Georgia	Yellow Point	Ruxton Pass	(C06)	SN	Short- Y	975	13/12/83
H417500 - 418999	Strait of Georgia	Yellow Point	Ruxton Pass	(C07)	SN	Short- Y	1456	14/12/83
H419000 - 420499	Strait of Georgia	Yellow Point	Boat Harbour	(C08)	SN	Short- Y	1465	14/12/83
H420500 - 421999	Strait of Georgia	Yellow Point	Boat Harbour	(C09)	SN	Short- Y	1474	15/12/83

Table 2. Herring tag releases in Johnstone Strait in the fall of 1983 and age distribution of herring in the tagging sets.

Locality	Map ref.	Date D/M/Y	Fish rel.	Tons set	Percent at age					
					1	2	3	4	5	6+
Deepwater Bay	A1	08/11/83	499	2	1	21	42	28	3	5
Deepwater Bay	A2	08/11/83	997	60	0	8	40	24	12	16
Deepwater Bay	A3	09/11/83	992	5	-	-	-	-	-	-
Deepwater Bay	A4	16/11/83	990	10	0	16	59	21	2	2
Deepwater Bay	A5	18/11/83	995	10	0	6	45	28	12	9
Deepwater Bay	A6	18/11/83	1465	50	0	9	59	26	3	3
Deepwater Bay	A7	28/11/83	1971	10	7	5	35	23	20	10
Deepwater Bay	A8	28/11/83	1477	1	30	8	27	23	8	4
Deepwater Bay	A9	29/11/83	1950	50	0	6	38	36	11	9
Deepwater Bay	A10	29/11/83	868	1	-	-	-	-	-	-
Kanish Bay	A11	09/11/83	497	6	44	31	15	7	0	3
Chonat Bay	B1	21/11/83	1470	10	0	21	62	10	4	3
Chanot Bay	B2	21/11/83	1468	20	0	26	61	10	3	0
Chanot Bay	B3	22/11/83	988	1	1	87	9	1	1	1
Chanot Bay	B4	22/11/83	992	1	0	80	18	2	0	0
Total	15 sets		17,619							

Table 3. Herring tag releases in the lower Strait of Georgia in the fall of 1983 and age distribution of herring in the tagging sets.

Locality	Map ref.	Date D/M/Y	Fish rel.	Tons set	Percent at age				
					2	3	4	5	6+
Danger Reefs	C1	22/11/83	994	7	-	-	-	-	-
Boulder Point	C2	23/11/83	991	1	-	-	-	-	-
Boat Harbour	C3	05/12/83	1440	4	51	44	4	1	0
Boat Harbour	C4	05/12/83	973	1	69	29	0	2	0
Ruxton Pass	C5	13/12/83	970	2	75	24	1	0	0
Ruxton Pass	C6	13/12/83	975	2	74	21	4	1	0
Ruxton Pass	C7	14/12/83	1456	4	84	16	0	0	0
Boat Harbour	C8	14/12/83	1465	6	85	15	0	0	0
Boat Harbour	C9	15/12/83	1474	4	92	8	0	0	0
Parker Island	D1	06/12/83	500	1	-	-	-	-	-
Parker Island	D2	06/12/83	997	1	-	-	-	-	-
Parker Island	D3	06/12/83	955	1	42	29	18	0	11
Parker Island	D4	06/12/83	1000	4	42	35	15	2	6
Parker Island	D5	07/12/83	988	1	30	39	18	5	8
Parker Island	D6	07/12/83	1495	1	20	41	22	12	5
Montague Harbour	D7	15/12/83	1993	10	66	32	2	0	0
Montague Harbour	D8	16/12/83	999	1	48	41	8	2	1
Total	17 sets		19,665						

Table 4. Number of tag recoveries from the beginning of tagging in the fall of 1979 to the end of the 1983-84 fishing season.

Recovery		Year and season of release									
Season(s)	Fishery	1979 Fall	1980 Spring	1980 Fall	1981 Spring	1981 Fall	1982 Spring	1982 Fall	1983 Spring	1983 Summer	1983 Fall
1979-80	All	35	22	-	-	-	-	-	-	-	-
1980-81	All	3	25	49	108	-	-	-	-	-	-
1981-82	All	0	15	19	65	539	310	-	-	-	-
1982-83	All	0	1	6	9	56	35	296	89	-	-
1983-84	Summer-fall	0	0	1	0	0	0	1	0	5	1
	Food	0	0	0	0	0	0	0	0	0	1
	Winter	0	0	0	1	2	0	1	0	0	54
	Roe	0	2	0	5	2	6	7	9	0	86
	Spring	0	0	0	0	0	0	0	0	0	0
	All	0	2	1	6	4	6	9	9	5	142
1979-84	All	38	65	75	188	599	351	305	98	5	142

Table 5. Recoveries (adjusted for gear and plant recovery rates)[a] for roe fisheries from fall taggings. (Dashes denote no catch; parentheses denote charter payment catch.)

District of release	Tagging period	No. of releases	Yr. of fishery	Area of recovery						
				15	14	17N	17S	23	24	25
Georgia Strait	11.11.80-10.1.81	8,600	1981	-	35	-	-	0	0	0
			1982	-	3	-	12	0	0	0
			1983	0	3	0	(0)	0	-	0
			1984	0	0	-	(0)	0	-	0
	9.11.81-14.12.81	19,755	1982	-	145	-	293	8	0	0
			1983	4	39	17	(8)	8	-	4
			1984	3	0	-	(0)	0	-	0
	9.11.82-18.1.83	18,797	1983	40	130	176	(26)	35	-	4
			1984	3	3	-	(0)	0	-	0
	22.11.83-16.12.83	19,665	1984	48	6	-	(14)	0	-	0
Johnstone Strait	9.11.82-23.11.82	11,881	1983	11	14	7	(0)	7	-	0
			1984	6	0	-	(0)	3	-	0
	8.11.82-29.11.82	17,619	1984	277	47	-	(0)	14	-	0

[a]For adjustment procedure see Haegele (1984a).

Table 6. Tag density (tags per 10,000 released per 1000 tonnes) in population for roe fisheries from fall taggings. (Dashes denote no catch; parentheses denote charter payment catch.)

Season of recovery	District of release	Tagging	Yr. of fishery	Av. days at large	Area of recovery						
					15	14	17N	17S	23	24	25
Same	Georgia Strait	80-Fa	1981	87	-	3.73	-	-	0.00	0.00	0.00
		81-Fa	1982	102	-	11.11	-	39.56	0.87	0.00	0.00
		82-Fa	1983	100	5.09	5.69	42.51	(44.51)	2.96	-	0.81
		83-Fa	1984	89	6.05	0.40	-	(14.85)	0.00	-	0.00
	Johnstone Strait	82-Fa	1983	105	2.21	1.0C	2.43	(0.00)	0.99	-	0.00
		83-Fa	1984	101	39.26	3.56	-	(0.00)	1.50	-	0.00
Next	Georgia Strait	80-Fa	1982	475	-	0.53	-	3.72	0.00	0.00	0.00
		81-Fa	1983	464	0.50	1.62	3.82	(13.63)	0.67	-	0.70
		82-Fa	1984	462	0.33	0.39	-	(0.00)	0.00	-	0.00
	Johnstone Strait	82-Fa	1984	470	1.24	0.00	-	(0.00)	0.46	-	0.00

Table 7. Recoveries (adjusted for gear and plant recovery rates)[a] from Johnstone Strait taggings by release location.

Year of tagging	Location	No. of releases	No. of recoveries (same season)	Recovery rate (%)
1983	Deepwater Bay	12,204	319	2.61
	Kanish Bay	497	5	1.01
	Chonat Bay	4918	14	0.28
1982	Deepwater Bay	2992	17	0.57
	Kanish Bay	3953	17	0.43
	Chonat Bay	4936	5	0.10

[a]For adjustment procedure see Haegele (1984a).

Table 8. Coded wire tagged herring releases in Statistical Area 15 in the spring of 1984 and the age distribution of herring in the tagging sets.

Locality	Date (D/M/Y)	Fish rel.	Tons set	Percent at age				
				2	3	4	5	6+
Hurtado Point	21/02/84	627	10	2	27	38	16	17
Powell River	22/02/84	1430	80	4	34	38	12	12
Westview	23/02/84	1546	45	1	35	37	16	11
Grief Point	23/02/84	836	35	0	57	28	15	0
Hurtado Point	24/02/84	1362	40	0	38	40	14	8
Powell River	24/02/84	1128	10	12	62	17	5	4
Westview	25/02/84	2001	150	2	50	30	8	10
Total	7 sets	8930						

Table 9. Results of coded wire tagging experiments aboard the WESTVIEW NO. 1 (February 20-26, 1984).

Date	Time of Tagging Set	Begin	End	Machine	Hrs. of tagging	No. of tags	Tags/ hour	Comments
21.02.84	0600	0700	0830	A	1.50	627	418	1
22.02.84	1700	1730	1930	A	2.00	770	385	
				B	2.00	819	410	
				Set	2.00	1589	795	
23.02.84	0600	0645	0910	A	2.42	834	345	
				B	2.42	883	365	
				Set	2.42	1717	710	
	1210	1300	1410	A	1.17	474	406	
				B	1.17	454	389	
				Set	1.17	928	928	
24.02.84	0610	0645	0930	A	2.00	740	370	2
				B	2.00	773	387	
				Set	2.00	1513	757	
	1445	1530	1730	A	1.25	555	444	3
				B	2.00	698	349	
				Set	2.00	1253	627	
25.02.84	1715	1800	2115	A	3.25	1060	326	
				B	3.25	1163	358	
				Set	3.25	2223	684	

COMMENTS: 1. Only 1 machine used - familiarization.

2. Tagging interrupted for 0.75 hr while net was adjusted.

3. Machine A inoperable for 0.75 hr.

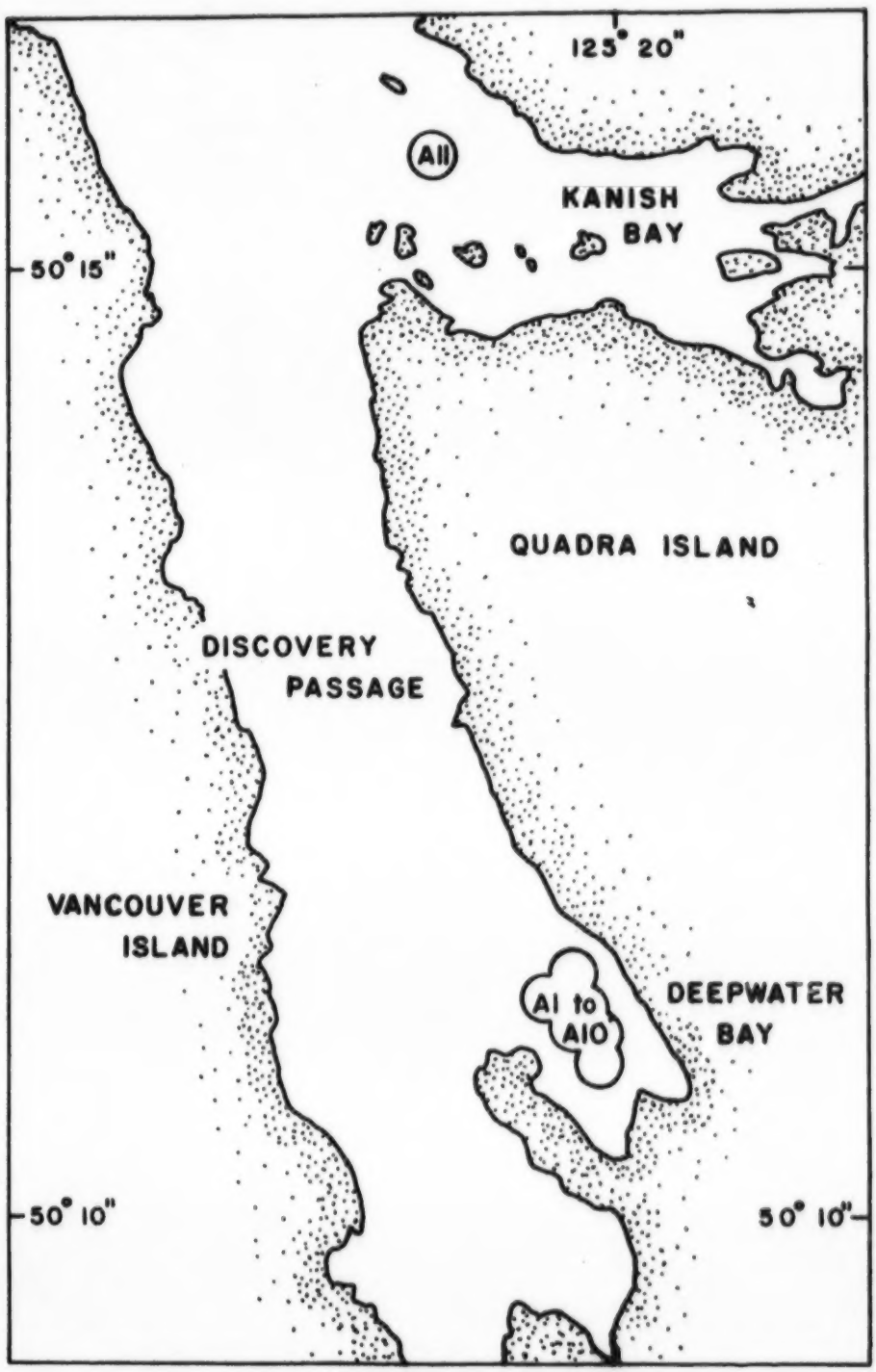

Fig. 1. Map of Discovery Passage showing fall 1983 (A) tagging locations.

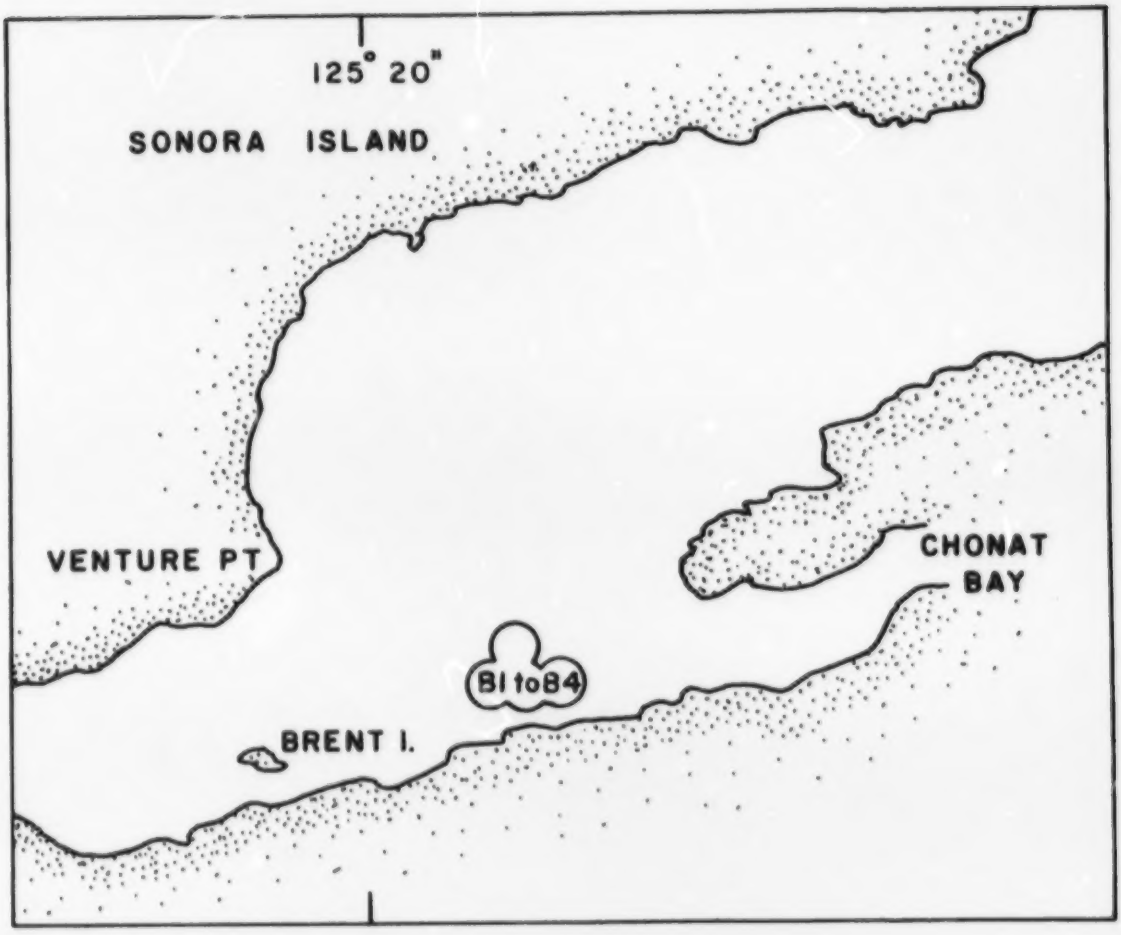

Fig. 2. Map of Okisollo Channel showing fall 1983 (B) tagging locations.

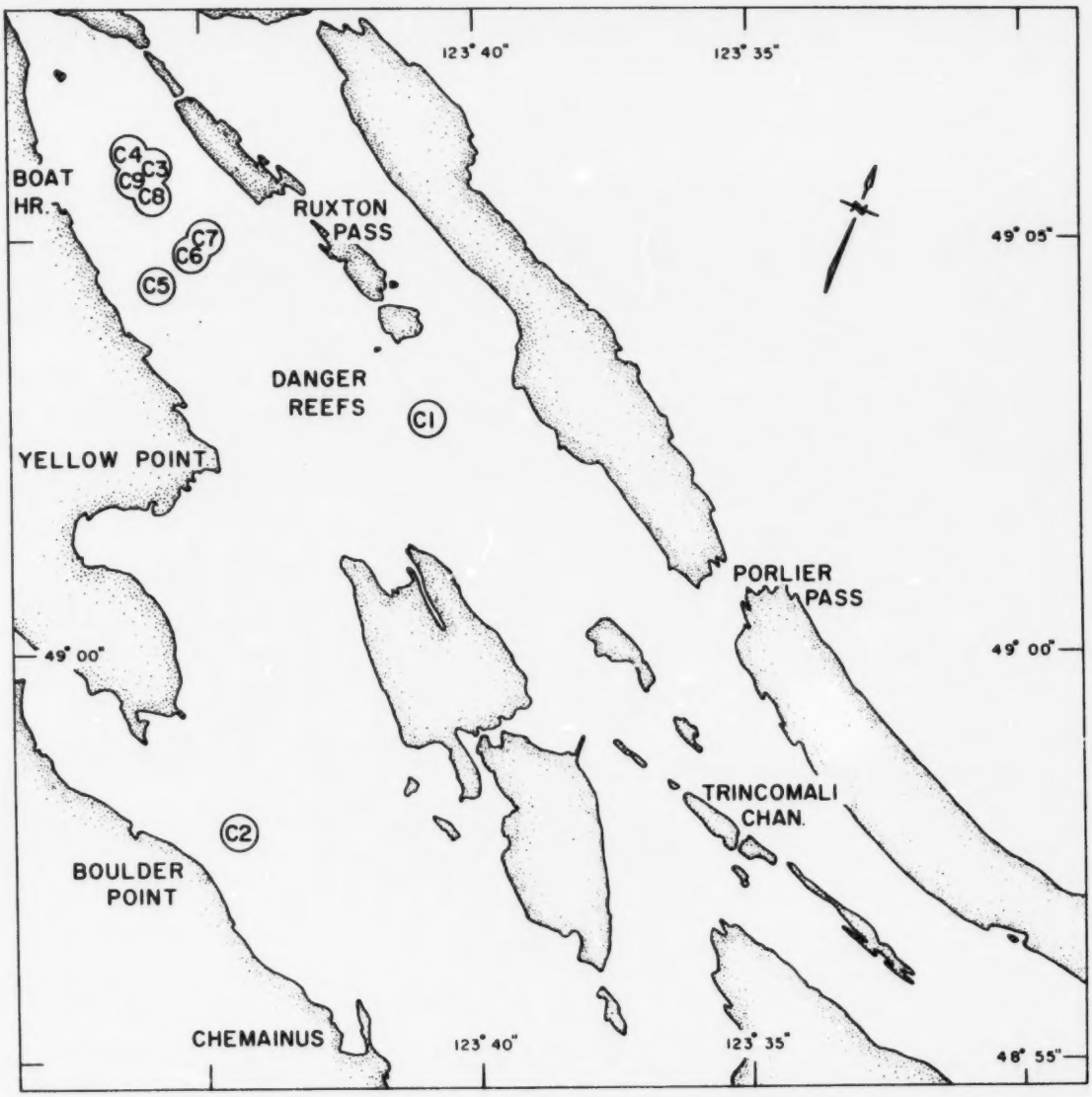

Fig. 3. Map of upper Area 17-S showing fall 1983 (C) tagging locations.

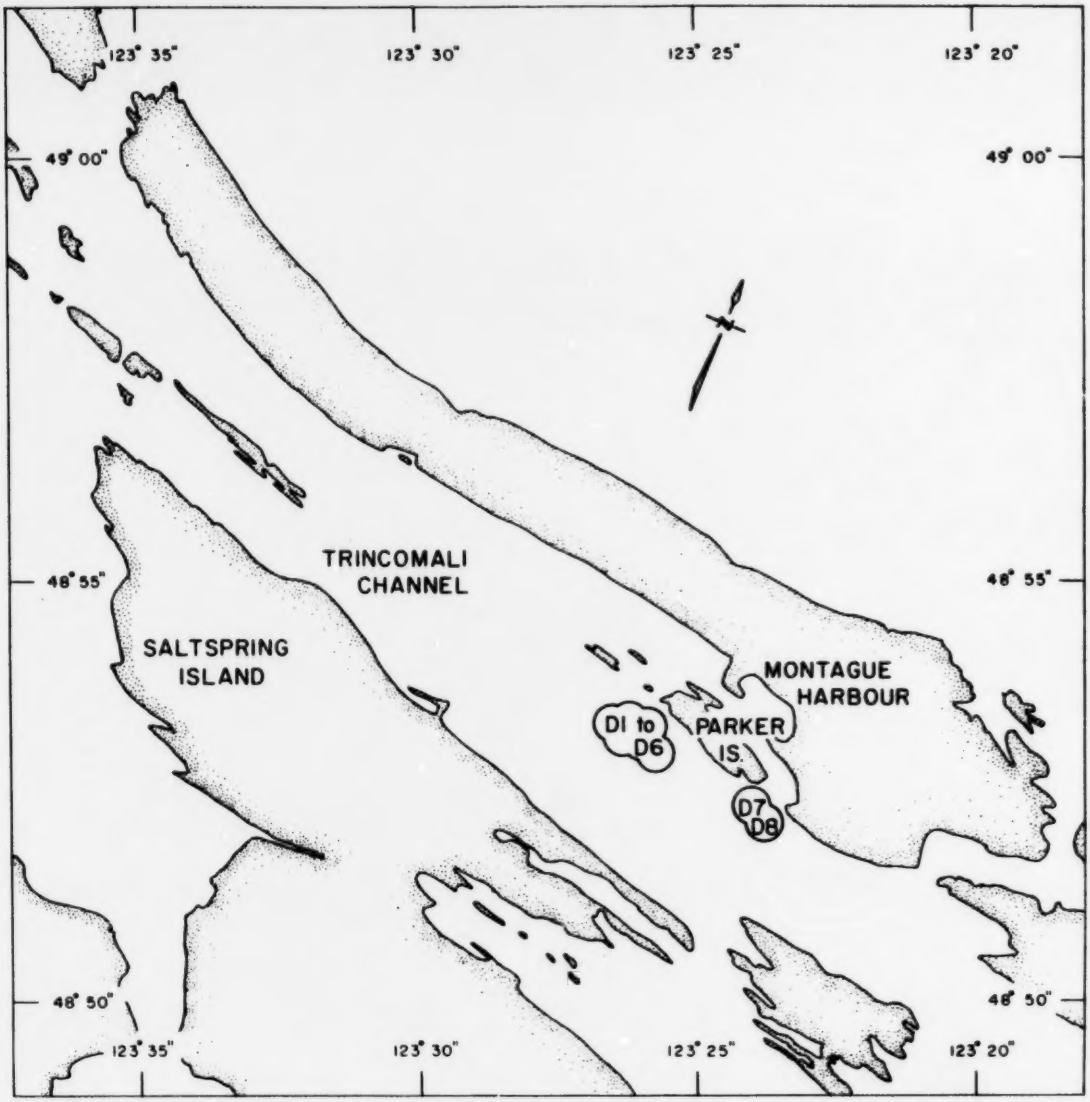

Fig. 4. Map of lower Area 17-S showing fall 1983 (D) tagging locations.

Appendix table 1. Winners for the February 1984 semi-annual herring tag prize draw.

Name	Amount	Plant
Willy Egeland	$200	Fisherman (Sidney, B.C.)
Carl Caunce	$ 50	Long Beach Shellfish (Delta, B.C.)
Pauline Beauvais	$ 50	Sea Products Ltd. (Ganges, B.C.)
Grace Bishop	$ 50	B.C. Packers Ltd. (Victoria, B.C.)
Jim Cameron	$ 50	Pender Harbour Packers (Madeira Park, B.C.)
Alice Chisholm	$ 50	Sea Food Products Ltd. (Port Hardy, B.C.)

Appendix table 2. Winners for the July 1984 semi-annual herring tag prize draw.

Name	Amount	Plant
Murray G. Sharpe	$200	J.S. McMillan Fisheries Ltd. (Vancouver, B.C.)
Harue Yoshida	$ 50	B.C. Packers Ltd. (Richmond, B.C.)
Yow Dang	$ 50	B.C. Packers Ltd (Richmond, B.C.)
Kathy Jang	$ 50	J.S. McMillan Fisheries Ltd. (Vancouver, B.C.)
Amy E. Shiho	$ 50	B.C. Packers Ltd. (Richmond, B.C.)
Gladys E. Farnsworth	$ 50	Canadian Fishing Co. Ltd. (Vancouver, B.C.)
Nancy Edwards	$ 10	Canadian Fishing Co. Ltd. (Vancouver, B.C.)
Willy Egeland	$ 10	Commercial Fisherman (Sidney, B.C.)
Donald I. Kirby	$ 10	Sport Fisherman (Victoria, B.C.)
Alice Chisholm	$ 10	Sea Food Products Ltd. (Port Hardy, B.C.)
Jenabai Jamal	$ 10	B.C. Packers Ltd. (Richmond, B.C.)
Fung Yiu Chiu	$ 10	B.C. Packers Ltd. (Richmond, B.C.)
Tai Git Chong	$ 10	B.C. Packers Ltd. (Richmond, B.C.)
John E. Parsons	$ 10	B.C. Packers Ltd. (Richmond, B.C.)
Amy E. Shiho	$ 10	B.C. Packers Ltd. (Richmond, B.C.)
Koji Kobayashi	$ 10	Aero Trading Co. Ltd. (Vancouver, B.C.)